WHAT IS CLAIMED IS:

1. A chemical vapor deposition process for forming a SiO_2 layer on a substrate comprising reacting water with a silicon precursor compound having the structure SiX_4, $Si(NR_2)_4$, $Si(OH)_a(OR)_{4-a}$ or $SiH_b(OR)_{4-b}$ wherein R is an alkyl group, each X is independently a halogen atom, and a and b are numbers from 0-4, in the presence of the substrate at a temperature of between about 290 K and 350 K and in the presence of ammonia or a Lewis base catalyst that is a gas under the conditions of the chemical vapor deposition process.

2. The process of claim 1 wherein the silicon precursor is $SiCl_4$ or $Si(OR)_4$ where each R contains up to four carbon atoms.

3. The process of claim 1 wherein the temperature is from about 313 to about 333 K.

4. The process of claim 1 wherein water is continually added to the process, and the silicon precursor is added intermittently.

5. The process of claim 4 wherein the ammonia or Lewis base is added intermittently to the process.

6. The process of claim 5 wherein the silicon precursor is added during the addition of the ammonia or Lewis base.

7. The process of claim 5 wherein the silicon precursor is $SiCl_4$ or TEOS.

8. The process of claim 7 wherein ammonia is added to the process.

9. The process of claim 5 wherein the Lewis base catalyst is a primary, secondary or tertiary amine.

10. The process of claim 1 wherein the substrate is silicon.

11. The process of claim 1 wherein the substrate is an organic polymer.

12. The process of claim 1 wherein the substrate is a biological material.